Installing the Cisco ONS 15600 OC48/STM16 LR/LH 16 Port 1550 Card

Note The terms "Unidirectional Path Switched Ring" and "UPSR" may appear in Cisco literature. These terms do not refer to using Cisco ONS 15xxx products in a unidirectional path switched ring configuration. Rather, these terms, as well as "Path Protected Mesh Network" and "PPMN," refer generally to Cisco's path protection feature, which may be used in any topological network configuration. Cisco does not recommend using its path protection feature in any particular topological network configuration.

Product Name: 15600-48L16-LR1550=

This document contains a description of OC48/STM16 LR/LH 16 Port 1550 card features, installation procedures, removal instructions, and technical specifications. Use this document in conjunction with the *Cisco ONS 15600 Reference Manual,* the *Cisco ONS 15600 Procedure Guide,* and the *Cisco ONS 15600 Troubleshooting Guide* when working with OC48/STM16 LR/LH 16 Port 1550 cards.

This document contains the following sections:

This document contains the following procedures:

Note For information about circuits and card capacities, see the *Cisco ONS 15600 Reference Manual.*

Warning **Only trained and qualified personnel should be allowed to install, replace, or service this equipment.**

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⚠ **Warning**   Read the installation instructions before you connect the system to its power source.

⚠ **Warning**   This unit is intended for installation in restricted access areas. A restricted access area is where access can only be gained by service personnel through the use of a special tool, lock and key, or other means of security, and is controlled by the authority responsible for the location.

⚠ **Warning**   Voltage is present on the backplane when the system is operating. To reduce risk of an electric shock, keep hands and fingers out of the power supply bays and backplane areas.

⚠ **Warning**   Invisible laser radiation may be emitted from the end of the unterminated fiber cable or connector. Do not stare into the beam or view directly with optical instruments. Viewing the laser output with certain optical instruments (for example, eye loupes, magnifiers, and microscopes) within a distance of 100 mm may pose an eye hazard. Use of controls or adjustments or performance of procedures other than those specified may result in hazardous radiation exposure.

OC48/STM16 LR/LH 16 Port 1550 Card

The OC48/STM16 LR/LH 16 Port 1550 card provides 16 long-range, Telcordia-compliant, GR-253 SONET OC-48 ports per card. The ports operate at 2488.320 Mbps over a single-mode fiber span. The OC48/STM16 LR/LH 16 Port 1550 card has four physical connector adapters with eight fibers per connector adapter. The card supports STS-1 payloads and concatenated payloads at STS-3c, STS-12c, STS-24c, or STS-48c signal levels.

OC48/STM16 LR/LH 16 Port 1550 Slots and Connectors

You can install OC48/STM16 LR/LH 16 Port 1550 cards in slots 1 through 4 and 11 through 14. The card provides four bidirectional OGI type connector adapters on the faceplate (angled downward), each carrying eight fiber strands (4 transmit and 4 receive).

OC48/STM16 LR/LH 16 Port 1550 Performance Monitoring Thresholds

Table 1 shows PM threshold values that apply to the OC48/STM16 LR/LH card.

Table 1   OC48/STM16 LR/LH Card Performance Monitoring Thresholds

Performance Monitoring	Thresholds (15 min./1 day)
Near-End Line Layer PMs for the OC48/STM16 LR/LH Card	
CV-L	21260/212600
ES-L	87/864
FC-L	10/40
SES-L	1/4

Table 1   OC48/STM16 LR/LH Card Performance Monitoring Thresholds (continued)

Performance Monitoring	Thresholds (15 min./1 day)
UAS-L	3/10
PSC	1/5
PSD	300/600
Near-End Section PMs for the OC48/STM16 LR/LH Card	
CV-S	10000/100000
ES-S	500/5000
SES-S	500/5000
SEFS-S	500/5000
Near-End Path PMs for the OC48/STM16 LR/LH Card	
CV-P	75/750
ES-P	60/600
FC-P	10/10
SES-P	3/7
UAS-P	10/10
PPJC-Pdet	0/0
NPJC-Pdet	0/0
PPJC-Pgen	0/0
NPJC-Pgen	0/0
Far-End Line PMs for the OC48/STM16 LR/LH Card	
CV-LFE	212600/21260
ES-LFE	864/87
FC-LFE	40/10
SES-LFE	4/1
UAS-LFE	10/3
Far-End Path PMs for the OC48/STM16 LR/LH Card	
CV-PFE	75/750
ES-PFE	60/600
FC-PFE	10/10
SES-PFE	3/7
UAS-PFE	10/10
Physical PMs for the OC48/STM16 LR/LH Card	
LBC-High	150%
LBC-Low	50%
OPT-High	120%
OPT-Low	80%

Table 1   OC48/STM16 LR/LH Card Performance Monitoring Thresholds (continued)

| Performance Monitoring	Thresholds (15 min./1 day)
OPR-High	200%
OPR-Low	50%

Note   SONET path PMs will not count unless IPPM is enabled. For additional information, see the Enabling Intermediate-Path Performance Monitoring section in the *Cisco ONS 15600 Procedure Guide.* To monitor the SONET path PMs log into the far-end node directly.

OC48/STM16 LR/LH 16 Port 1550 Faceplate and Block Diagram

Figure 1 shows the OC48/STM16 LR/LH 16 Port 1550 faceplate and a block diagram of the card.

Figure 1   *OC48/STM16 LR/LH 16 Port 1550 faceplate and block diagram*
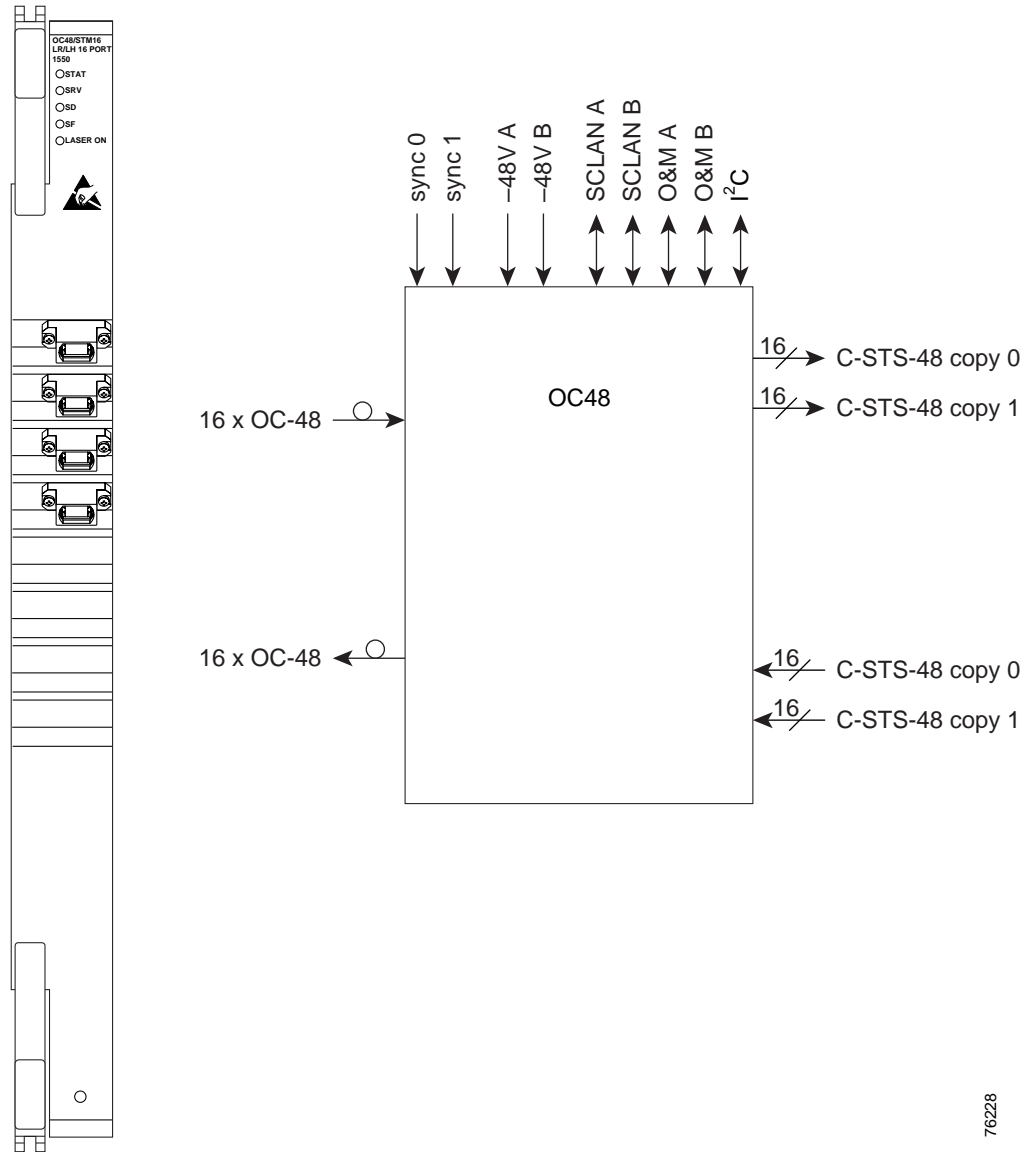
OC48/STM16 LR/LH 16 Port 1550 Card-Level Indicators

Table 2 describes the functions of the card-level LEDs on the OC48/STM16 LR/LH 16 Port 1550 card.

Table 2   OC48/STM16 LR/LH 16 Port 1550 Card-Level Indicators

Indicators	Color	Description
STAT LED	Red	Indicates a hardware fault; this LED is off during normal operation. Replace the card if the STAT LED persists. During diagnostics, the LED will flash quickly during initialization and flash slowly during configuration synchronization.
SRV LED	Green	Indicates the service mode of the card. Green indicates the card is in use; off indicates when the card can be removed for service.
LASER ON	Green	The green LASER ON LED indicates that at least one of the card's lasers is active.

OC48/STM16 LR/LH 16 Port 1550 Network-Level Indicators

Table 3 describes the functions of the network-level LEDs on the OC48/STM16 LR/LH card.

Table 3   OC48/STM16 LR/LH 16 Port 1550 Network-Level Indicators

Indicators	Color	Description
SD LED	Blue	The blue SD LED indicates a signal degrade or condition such as a low level signal on at least one of the card's ports.
SF LED	Red	The red SF LED indicates a signal failure or condition such as LOS, LOF, or high BERs on at least one of the card's ports. The red SF LED also illuminates when the transmit and receive fibers are incorrectly connected. When the fibers are properly connected, the LED turns off.

⚠ **Warning**   **Invisible laser radiation may be emitted from the end of the unterminated fiber cable or connector. Do not stare into the beam or view directly with optical instruments. Viewing the laser output with certain optical instruments (for example, eye loupes, magnifiers, and microscopes) within a distance of 100 mm may pose an eye hazard. Use of controls or adjustments or performance of procedures other than those specified may result in hazardous radiation exposure.**

OC48/STM16 LR/LH 16 Port 1550 Specifications

Table 4 shows the OC48/STM16 LR/LH card specifications.

Table 4   OC48/STM16 LR/LH 16 Port 1550 Card Specifications

Specification Type	Description
Line	Bit Rate: 2.49 Gbps
	Code: Scrambled NRZ
	Fiber: 1550 nm single-mode
	Loopback Modes: Facility
	Connectors: OGI
	Compliance: Telcordia SONET, GR-253
Transmitter	Max. Transmitter Output Power: +3 dBm
	Min. Transmitter Output Power: –2 dBm
	Center Wavelength: 1520 nm to 1580 nm
	Nominal Wavelength: 1550 nm
	Transmitter: Distributed feedback laser
Receiver	Max. Receiver Level: –9 dBm
	Min. Receiver Level: –28 dBm
	Receiver: InGaAs APD photo detector
	Link Loss Budget: 26 dB min., with 1 dB dispersion penalty
Loopback Mode	Facility (Line)
	Note You must use a 19 to 24 dB (20 recommended) fiber attenuator when connecting a fiber loopback to an OC48/STM16 LR/LH 16 Port 1550 card. Never connect a direct fiber loopback.
Operating Temperature	23 to 122 degrees Fahrenheit (–5 to +50 degrees Celsius)
Operating Humidity	5 to 95%, non-condensing
Dimensions	Height: 16.50 in. (419 mm)
	Width: 1.07 in. (27 mm)
	Depth: 18.31 in. (465 mm)
	Card Weight: 5.0 lbs (2.27 kg)
Compliance	Telcordia SONET, GR-253
	When installed in a system, ONS 15600 cards comply with these safety standards: UL 60950, CSA C22.2 No. 950, EN 60950, IEC 60950
	Eye Safety Compliance: Class 1 (21 CFR 1040.10 and 1040.11) and Class 1 (IEC 60825) laser products

OC48/STM16 LR/LH 16 Port 1550 Card OGI Connector Pinout

Table 5 shows the OC48/STM16 LR/LH card OGI connector pinouts.

Table 5   OC48/STM16 LR/LH 16 Port 1550 Card OGI Connector Pinout

Connector	OGI Pin and Card Port							
1	1	2	3	4	5	6	7	8
	Transmit 4	Receive 4	Transmit 3	Receive 3	Transmit 2	Receive 2	Transmit 1	Receive 1
2	1	2	3	4	5	6	7	8
	Transmit 8	Receive 8	Transmit 7	Receive 7	Transmit 6	Receive 6	Transmit 5	Receive 5
3	1	2	3	4	5	6	7	8
	Transmit 12	Receive 12	Transmit 11	Receive 11	Transmit 10	Receive 10	Transmit 9	Receive 9
4	1	2	3	4	5	6	7	8
	Transmit 16	Receive 16	Transmit 15	Receive 15	Transmit 14	Receive 14	Transmit 13	Receive 13

Replace an OC-48 Card

Purpose	This procedure is used to replace a faulty OC-48 card.
Tools/Equipment	Replacement OC-48 card
Prerequisite Procedures	None
Required/As Needed	As needed
Onsite/Remote	Onsite

Warning **Do not reach into a vacant slot or chassis while you install or remove a module or a fan. Exposed circuitry could constitute an energy hazard.**

Note Card removal raises an improper removal (IMPROPRMVL) alarm, but this clears after the card replacement is completed.

Step 1 Log into the node where you will replace the OC-48 card. If necessary, refer to the *Cisco ONS 15600 Procedure Guide* for a login procedure.

Step 2 Ensure that the card you are replacing does not carry traffic in a 1+1 group:

a. In the node view, click the **Maintenance > Protection** tabs.

b. Choose the first group listed under Protection Groups.

c. Verify that the slot number for the card you are replacing does not appear in the Selected Groups list. For example, if you are replacing the OC-48 card in slot 3, make sure that Selected Groups does not contain any entries that start with s3, regardless of the port.

d. Repeat Steps b and c for each protection group.

e. If any of the groups contain a port on the card you want to replace, perform the "Force-Switch 1+1 Ports" task on page 10.

Step 3   Ensure that the card you are replacing does carry path protection circuit traffic.

> ✎
> **Note**   A port can be part of a 1+1 protection group or part of a path protection, but it cannot be configured for both. However, different ports on one card can be configured in different ways. If you move all of the traffic off some 1+1 ports, you still need to check whether the remaining ports are carrying path protection traffic.

    a.   In the CTC node view, click **View > Go to Parent View**.

    b.   Click the **Circuits** tab.

    c.   View the circuit source and destination ports and slots. If any circuits originate or terminate in the slot containing the card you are replacing, perform the "Force-Switch Path Protection Paths" task on page 10.

> ✎
> **Note**   If the card you are replacing is not configured for any port or circuit protection, but does carry traffic, bridge and roll this traffic onto another card. Follow the "Bridge and Roll Traffic" procedure in the *Cisco ONS 15600 Procedure Guide*.

Step 4   Remove any fiber optic cables from the ports.

Step 5   Physically remove the card to be replaced from the ONS 15600 shelf:

    a.   Open the card ejectors.

    b.   Slide the card out of the slot.

Step 6   Physically replace the OC-48 card in the shelf:

    a.   Open the ejectors on the replacement card.

    b.   Slide the replacement card into the slot along the guide rails until it contacts the backplane.

    c.   Close the ejectors.

> ✎
> **Note**   When you replace a card with an identical type of card, you do not need to make any changes to the database.

Step 7   Clear the Force switches.

    •   To clear 1+1 Force switches, complete the "Clear a 1+1 Force Switch" task on page 11.

    •   To clear Path Protection Force switches, complete the "Clear a Path Protection Force Switch" task on page 11.

Step 8   Once the card is placed in service and is receiving traffic, reset the card's physical receive power level threshold in CTC:

    a.   Double-click the newly installed card in CTC node view.

    b.   Click the **Provisioning > Threshold** tabs.

    c.   Click the **Physical** radio button.

    d.   Click **Set OPM** for each port on the card.

Force-Switch 1+1 Ports

Purpose	This procedure forces 1+1 protection group traffic from one port in the group to the other. It is used to remove traffic from a card for replacement.
Tools/Equipment	Installed OC-N cards
Prerequisite Procedures	Installed OC-48 card
Required/As Needed	As needed
Onsite/Remote	Onsite or remote

Note The Force switch is performed even if the destination path is degraded.

Step 1 In the CTC node view, click the **Maintenance > Protection** tabs.

Step 2 Select the protection group you want to Force-switch from Protection Groups.

Step 3 Under Selected Groups, choose the port belonging to the card you are replacing by clicking it. For example, if the card you are replacing contains the protect/standby port, click this port.

Step 4 Click the **Force** button.

Step 5 If the switch is successful, the group will say either FORCE TO WORKING or FORCE TO PROTECT.

Step 6 Return to the "Replace an OC-48 Card" procedure on page 8, or to your originating procedure.

Force-Switch Path Protection Paths

Purpose	This procedure forces all circuits in a path protection from one span to the other. It is used to remove traffic from a card that originates or terminates path protection circuits.
Tools/Equipment	Installed OC-48 card
Prerequisite Procedures	None
Required/As Needed	As needed
Onsite/Remote	Onsite or remote

Note The Force switch is performed even if the destination path is degraded.

Step 1 In the CTC node view, click **View > Go to Network View** if this view is not already displayed.

Step 2 Click the **Circuits** tab.

Step 3 Note, print, or export the list of circuits from this tab, and mark the circuits involving the slot containing the card you are replacing.

For information about doing this from CTC, refer to the procedures in the *Cisco ONS 15600 Procedure Guide*.

Step 4 In the network map, right-click a circuit connected to the node where you are performing the Force switch. Choose **Circuits** from the shortcut menu.

The Circuits window is displayed.

Step 5 Verify that this list contains the same circuits that you marked in the list.

Step 6 Choose **Force** from the pull-down menu at the bottom of the window.

If the switch was successful, all circuits will show FORCE in the Switch State column.

Step 7 Return to the"Replace an OC-48 Card" procedure on page 8, or to your originating procedure.

Clear a 1+1 Force Switch

Purpose	This procedure clears a 1+1 protection group Force switch. It is used to revert traffic to the original port after the card has been serviced.
Tools/Equipment	None
Prerequisite Procedures	"Force-Switch 1+1 Ports" section on page 10
Required/As Needed	As needed
Onsite/Remote	Onsite or remote

Note If the ports terminating a span are configured as revertive, clearing a Manual or Force switch to protect (or working) moves traffic back to the working (or protect) port. If ports are not configured as revertive, clearing a Manual or Force switch to protect does not move traffic back.

Step 1 In the CTC node view, click the **Maintenance** > **Protection** tabs.

Step 2 Under Protection Groups, click the protection group containing the port you want to clear.

Step 3 Under Selected Group, click the port you want to clear.

Step 4 In the Inhibit Switching area, click **Clear**.

Step 5 Click **Yes** in the confirmation dialog box.

The lockout is cleared.

The Force switch is cleared. Traffic will revert to the original port if the group was configured for revertive switching.

Step 6 Return to the "Replace an OC-48 Card" procedure on page 8, or to your originating procedure.

Clear a Path Protection Force Switch

Purpose	This procedure clears a path protection circuit Force switch. It is used to revert traffic to the original circuits after the card has been serviced.
Tools/Equipment	None
Prerequisite Procedures	"Force-Switch Path Protection Paths" section on page 10
Required/As Needed	As needed
Onsite/Remote	Onsite or remote

Step 1   In the CTC node view, click **View > Go to Network View** if this view is not already displayed.

Step 2   In the network map, right-click the span that you Force switched. Choose **Circuits** from the shortcut menu.

The Circuits window is displayed.

Step 3   Choose **Clear** from the pull-down menu at the bottom of the window.

The Force switch is cleared.

> **Note**   Active circuits are displayed green in the Circuits window. Standby circuits are displayed purple in the window.

> **Note**   If these circuits are configured for revertive switching, they will revert to original paths after the revertive time expires. If they are not revertive, they will not move back unless you Force-switch them back. If the switch state is clear, you can complete the "Force-Switch Path Protection Paths" task on page 10 again to force traffic back to the original path.

Step 4   Return to the "Replace an OC-48 Card" procedure on page 8, or to your originating procedure.

Related Documentation

- DOC-7814303= *Cisco ONS 15600 Procedure Guide*
- DOC-7814706= *Cisco ONS 15600 Reference Manual*
- DOC-7814707= *Cisco ONS 15600 Troubleshooting Guide*

Obtaining Documentation

The following sections explain how to obtain documentation from Cisco Systems.

World Wide Web

You can access the most current Cisco documentation on the World Wide Web at the following URL:

http://www.cisco.com

Translated documentation is available at the following URL:

http://www.cisco.com/public/countries_languages.shtml

Documentation CD-ROM

Cisco documentation and additional literature are available in a Cisco Documentation CD-ROM package, which is shipped with your product. The Documentation CD-ROM is updated monthly and may be more current than printed documentation. The CD-ROM package is available as a single unit or through an annual subscription.

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- Registered Cisco Direct Customers can order Cisco product documentation from the Networking Products MarketPlace:

  http://www.cisco.com/cgi-bin/order/order_root.pl

- Registered Cisco.com users can order the Documentation CD-ROM through the online Subscription Store:

  http://www.cisco.com/go/subscription

- Nonregistered Cisco.com users can order documentation through a local account representative by calling Cisco corporate headquarters (California, USA) at 408 526-7208 or, elsewhere in North America, by calling 800 553-NETS (6387).

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San Jose, CA 95134-9883

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Technical Assistance Center

The Cisco TAC is available to all customers who need technical assistance with a Cisco product, technology, or solution. Two types of support are available through the Cisco TAC: the Cisco TAC Web Site and the Cisco TAC Escalation Center.

Inquiries to Cisco TAC are categorized according to the urgency of the issue:

- Priority level 4 (P4)—You need information or assistance concerning Cisco product capabilities, product installation, or basic product configuration.
- Priority level 3 (P3)—Your network performance is degraded. Network functionality is noticeably impaired, but most business operations continue.
- Priority level 2 (P2)—Your production network is severely degraded, affecting significant aspects of business operations. No workaround is available.
- Priority level 1 (P1)—Your production network is down, and a critical impact to business operations will occur if service is not restored quickly. No workaround is available.

Which Cisco TAC resource you choose is based on the priority of the problem and the conditions of service contracts, when applicable.

Cisco TAC Web Site

The Cisco TAC Web Site allows you to resolve P3 and P4 issues yourself, saving both cost and time. The site provides around-the-clock access to online tools, knowledge bases, and software. To access the Cisco TAC Web Site, go to the following URL:

http://www.cisco.com/tac

All customers, partners, and resellers who have a valid Cisco services contract have complete access to the technical support resources on the Cisco TAC Web Site. The Cisco TAC Web Site requires a Cisco.com login ID and password. If you have a valid service contract but do not have a login ID or password, go to the following URL to register:

http://www.cisco.com/register/

If you cannot resolve your technical issues by using the Cisco TAC Web Site, and you are a Cisco.com registered user, you can open a case online by using the TAC Case Open tool at the following URL:

http://www.cisco.com/tac/caseopen

If you have Internet access, it is recommended that you open P3 and P4 cases through the Cisco TAC Web Site.

Cisco TAC Escalation Center

The Cisco TAC Escalation Center addresses issues that are classified as priority level 1 or priority level 2; these classifications are assigned when severe network degradation significantly impacts business operations. When you contact the TAC Escalation Center with a P1 or P2 problem, a Cisco TAC engineer will automatically open a case.

To obtain a directory of toll-free Cisco TAC telephone numbers for your country, go to the following URL:

http://www.cisco.com/warp/public/687/Directory/DirTAC.shtml

Before calling, please check with your network operations center to determine the level of Cisco support services to which your company is entitled; for example, SMARTnet, SMARTnet Onsite, or Network Supported Accounts (NSA). In addition, please have available your service agreement number and your product serial number.